

ON INFLUENCE OF PYROXENE ON S-ASTEROID SPECTRA. D. I. Shestopalov and L. F. Golubeva, Shemakha Astrophysical Observatory, Shemakha 373243, Azerbaijan.

Discussion about the nature of S-asteroid matter is still far from completion. We lead relations between the following spectral characteristics of S-asteroids:

1. λ (505 nm) - center position of the Fe^{2+} absorption band in spectra of pyroxene. Spectra of another probable minerals on S-asteroid surfaces (for example, olivine, feldspar, NiFe-metal) haven't absorption bands at this wavelength. Therefore, 505-nm band has simple interpretation: its position depends only on pyroxene chemical composition. This band has been registered by us in eight S-asteroid spectra (NN 3, 6, 8, 11, 12, 15, 68, and 532) [1,2] and Vesta spectra (average data from [3]).

2. λ_p - position of maximum of normalized reflectance coefficients in 700 nm region. This parameter was calculated with quadratic interpolation of spectral coefficients near maximum reflectance on 24-color [4] and 8-color [5] spectrometry data. In general case λ_p depends on content of olivine and pyroxene on the surface and chemical composition of these minerals.

3. λ (950 nm) - 950-nm band position according to [6]. The mineralogic interpretation is the same that of previous case.

4. $u - x = (u - v) + (v - x)$ - color index of 8-color asteroid survey [5], logarithmic related with linear spectral gradient between points 437 and 853 nm. In general case $u - x$ can depend on abundance of mafic minerals and NiFe-metal on asteroid surfaces.

Whole countour of 1900-nm absorption band is unknown on 52-color spectrometry data. Therefore the problem takes place how correctly draw a continuum line in this spectral region. For this reason we don't use 1900-nm band parameters from [6].

Figure 1a shows the straight linear correlation between λ_p and λ (5050 nm) for S-asteroids and Vesta (correlation coefficient $r = 0.95 \pm 0.10$). Hence, the shift of the reflectance

maximum in S-asteroid spectra is caused by the change of pyroxene composition.

Figure 1b shows the straight linear correlation between λ (505 nm) and λ (950 nm) for S-asteroids ($r = 0.88 \pm 0.17$). Hence, the 950-nm band shift in S-asteroid spectra is caused by the change in pyroxene chemical composition.

Figure 1c shows the straight linear correlation between λ_p and λ (950 nm) for S-asteroid ($r = 0.71 \pm 0.11$) and is in accordance with aforesaid conclusions. Really, suppose that longwavelength shift of 950-nm band is caused by increase of olivine content on S-asteroid surfaces [6]. The reflectance maximum in olivine spectra is located usually at the lesser wavelength than one in pyroxene spectra. In such case it should have expected the inverse correlation between λ_p and λ (950 nm).

Figure 1d shows straight linear correlation between λ (950 nm) and $u - x$ ($r = 0.88 \pm 0.08$). Hence, the variation of S-asteroid spectra slope in 437–853 nm region is caused by change of pyroxene chemical composition on their surfaces.

So, we arrive at the main conclusion: the optical predominance of the pyroxene takes place in S-asteroid spectra.

Clearly, the obtained conclusion 1) doesn't contradict the existence of another minerals on S-asteroid surfaces; 2) doesn't prove physical prevalence of pyroxene in S-asteroid matter.

References: [1] Shestopalov D. I. et al (1991) *Astron. Vestn.*, 25, 442. [2] Shestopalov D. I. and Golubeva L. F. (1991) *Sov. Astron. Lett.*, 17, 193. [3] Golubeva L. F. and Shestopalov D. I. (1996) On Vesta's Pyroxenes (submitted in *Astron. Vestn.*). [4] Chapman C. R. and Gaffey M. J. (1979) in *Asteroids* (Univ. Arizona Press), 1064. [5] Zellner B. et al. (1985) *Icarus* 61, 335. [6] Gaffey M. J. (1993) *Icarus*, 106, 573.

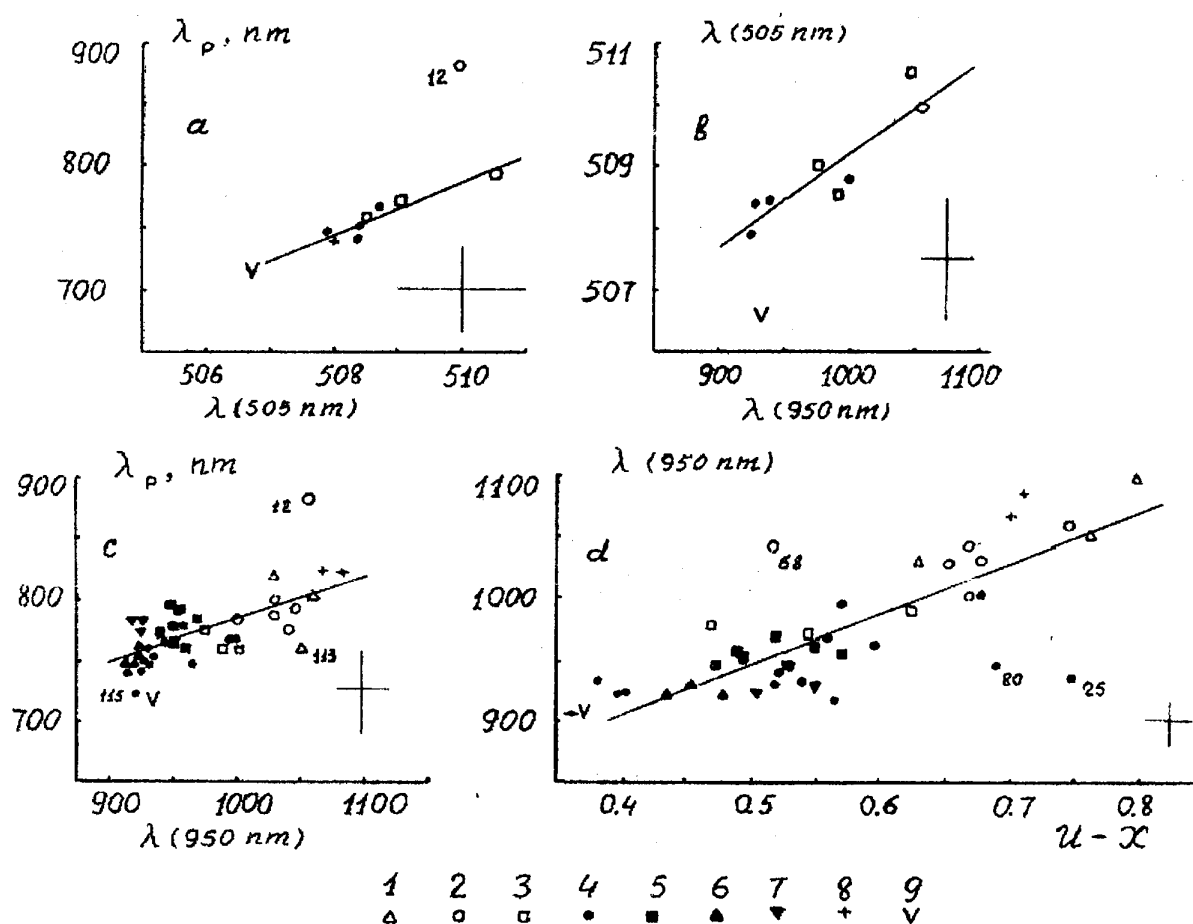


Fig. 1. Relations between some spectral parameters of S-asteroids. Following designations are received: 1 - S (I), 2 - S (II), 3 - S (III), 4 - S (IV), 5 - S (V), 6 - S (VI), 7 - S (VII), 8 - ungrouped (subtypes of S-asteroids from [6]), 9 - Vesta. (a) relation between 700 nm reflectance maximum and 505 nm band position; (b) relation between 505-nm and 950 nm absorption band positions; (c) relation between 700-nm reflectance maximum and 950-nm band position; (d) relation between 950-nm band position and color-index $u-x$. Typical error are shown on every figures.